This course can be adapted to virtual classroom mode

Pumps Operation

5 days **PUMPOP-EN-A**

Overview

LEVEL

Skilled

PURPOSE

This course provides a better understanding of centrifugal and displacement volumetric pumps technology and operating principles.

LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

describe the behavior and the operation of pumps,

analyze the technical solutions applied in their units,

establish a diagnosis of the incidents and participate in the troubleshooting meetings,

identify essential elements in pump selection.

WAYS AND MEANS

Functional approach for a better understanding.

Numerous examples and cases studies from the Oil & Gas production industry and analysis of manufacturer file.

LEARNING ASSESSMENT

Written test upon training course completion.

PREREQUISITES

Provide evidence of a professional experience of at least 1 month related to the concerned field.

Agenda

PUMPING PREREQUISITES — 0.5 d

Pump performance:
Hydraulic pumping fundamentals.
Pressure, flowrate, specific gravity, friction losses, centrifugal force, height/pressure relation, mechanic and hydraulic power, vapor pressure curve, energy conservation.
Pump choice and typical upstream implementations.

TECHNOLOGY & PERFORMANCE — 2 d

Centrifugal pumps:
Functional approach: study step by step of the main functions; process (impeller, wear rings, balancing, pump body shape…); sealing: mechanical sealing, typical arrangements (single, dual, dry seal), selection according API 382 standard, materials, type, friction face heating; support (axial and radial, thrust and journal bearings); lubrication (oil and grease…); monitoring (rotor displacement, vibrations, temperature, pressure…).
Building step by step a monocellular centrifugal pump.
Volumetric pumps:

Different types of pumps: rotary and reciprocating pumps.
Operating principle and utilization of the different types of pumps.
Influence of clearance, internal leaks, nature of product on flow rate and pressure.
Flow rate control.
Installation guidelines: position of tanks, line diameters, metering drums, pulsation dampeners, pressure valves.
Particular choices:
Coupling and driven machines.
ATEX: material consequences.

OPERATION & MONITORING

1.5 d

Preparation: filling, draining; spare pumps: heating, ancillaries.
Start-up/shutdown: priming, controls, hammer shock, risks for process and pump.
Surveillance: parameters (vibration levels, noises, bearing housing temperature, motor intensity, pressures); impact of stream parameters; hazards.
Parallel and series operations: risks, dysfunction.

TROUBLESHOOTING

0.75 d

Troubleshooting of most frequent problems (cavitation, priming situation, low flowrate…).

SAFETY IN OPERATION

0.25 d

Leaks, vibrations, feed, overcharge…
Analysis of industrial incidents and accidents.